On Applying Six Sigma To Improving The Relationship Quality Of Fitness And Health Clubs

Kuei-Mei Cheng, National Taiwan University of Physical Education & Sport, Taiwan, R.O.C.

ABSTRACT

Running a fitness and health club is a service-intensive business. Although it is not an easy job to provide high quality and satisfying services to customers, it is in fact the ultimate goal for most fitness and health clubs. For this reason, providing quality services and building a good relationship with customers has become an important issue for operating and managing a fitness and health club. This study adopts Six Sigma and the performance evaluation matrix as two major research tools. By implementing the steps (define, measure, analyze, improve, and control) of Six Sigma and through the nine performance boxes generated by the importance-satisfaction matrix (with importance as the horizontal axis and satisfaction as the vertical axis) of Importance-Performance Analysis (IPA), this study aims to specifically identify the services most requested by customers in an effort to provide highly satisfying services and improve relationship quality.

Keywords: 6-Sigma; Performance Evaluation Matrix; Relationship Quality

I. INTRODUCTION

With the advancement of technology and information, most industries in Taiwan have transited from being labor-intensive to being high-tech and capital-intensive. As the economy grows and technology develops, machines are replacing the labor force. As a result, the Taiwanese are not only faced with high pressure but also a lack of physical exercise, which in turn causes the emergence of lifestyle diseases. However, the Taiwanese are paying more attention to their leisure lifestyle and starting to do leisure exercises in order to release stress and improve their health; consequently, leisure exercises have become a part of people's life. An increasing number of people are acquiring the habit of exercising regularly, and the demand for leisure exercises and facilities is growing accordingly. In light of this, some foreign traders have brought American-style gymnasiums in Taiwan in 1999. These gymnasiums offer modern exercise space and facilities as well as a variety of courses with flexible pricing plans, making the Taiwanese gradually accustomed to exercising in fitness and health clubs and driving the development of this industry (Jiang, 2002).

Running a fitness and health club is a service-intensive business. The services are intangible, inseparable, variable, and perishable. Although it is not an easy job to provide high quality and satisfying service to customers, it is, in fact, the ultimate goal for most fitness and health clubs. For this reason, providing quality services and building a good relationship with customers has become an important issue for operating and managing a fitness and health club. The biggest problem faced with fitness and health clubs in Taiwan is the high customer attrition rate. The attrition rate is usually as high as 20% to 40% and creates increased operational costs and reduces profits. Hence, in order to improve the relationship quality of fitness and health clubs and thereby retain customers and reduce attrition rates has become a major goal for the fitness and health industry (Tang, 2003; Cheng, 2003). Due to the fierce competition in the business realm and rising consumer awareness, more and more enterprises adopt Six Sigma to improve their operational performance. By combining the cost control and the statistical analysis in Six Sigma as well as specifying inadequate management processes, enterprises have come up with a scientific and efficient method to respond to operational and management problems. Nevertheless, the quality of services tends to vary

when interfered by subtle factors. Therefore, it is quite challenging and difficult to introduce Six Sigma to the service industry (Wu, 2011). In spite of this, many studies show it is possible to improve the quality performance of customized services with Six Sigma (Biolos, 2002) because introducing it to the service industry allows service providers to reduce the number of defects (e.g. customer complaints or poor service attitudes) in the process of providing services. Among all approaches to implementing Six Sigma, the DMAIC is the most frequently used method by the service industry. Therefore, this study adopts Six Sigma to explore the relationship quality of fitness and health clubs, hoping that the results may serve as a reference for improving the relationship quality of fitness and health clubs.

II. METHODOLOGY

Many international enterprises in Europe and the United States have already been applying Six Sigma to improving customer satisfaction and maintaining their leading position in the market. A process improved with Six Sigma has only three to four errors in every one million operations, which explains why it is a nearly perfect solution for enterprises (Peter & Patrick, 2000). From the perspective of management science, Six Sigma is regarded as a new type of management method which helps to reduce the number of defects, errors, and costs during the manufacturing process. Lee (2003) also pointed out that the use of Six Sigma allows an enterprise to understand customers' needs, value the input variable x's and output variable y's during a business process, and improve the process based on data and facts, which in turn create more potential benefits. Therefore, this study adopts Six Sigma and the performance evaluation matrix as two major research tools. The implementation of Six Sigma includes five steps: define, measure, analyze, improve, and control. "Define" means to identify customers' needs and the things they want the most; "measure" means to collect data and calculate the chance of making errors during an operational process; "analyze" means to look into the data to seek out the root cause of errors, "improve" means to find out the best solution and craft an action plan for implementing the solution; and "control" means to sustain the improvement and avoid the recurrence of errors. Through the five steps of Six Sigma, an enterprise can specifically determine the services needed by customers and control and reduce defects in order to provide the best services to customers (Lee & Wu, 2003). The performance evaluation matrix is proposed by Martilla & James (1977); its major function is to help enterprises to determine the importance and performance of a product or service, so that they can create improved marketing strategies. This study adopts the concept of Hung et al. (2003) and uses the nine performance boxes generated by the importance-satisfaction matrix (with importance as the horizontal axis and satisfaction as the vertical axis) of the IPA. The research of Matzler et al. (2004) also shows that the use of IPA helps a manager to identify the type of services which can produce high customer satisfaction.

III. RESULTS AND DISCUSSION

As mentioned previously, running a fitness and health club is a service-intensive business, and to maintain high quality and satisfaction ratings is an importance issue to all fitness centers. Schibrowsky and Lapidus (1994) pointed out that for every customer lost, a company had to invest in the exploration of a new customer at an expense five times that of maintaining existing customers.

Define and Measure

This study uses the steps for implementing Six Sigma and the placement of each service on the performance evaluation matrix to find out the relationship quality of high customer-perceived importance but low satisfaction. By doing so, this study defines a measuring index to measure the gap between customer-perceived importance and satisfaction and proposes an objective evaluation method and process for this index. To measure the gap between customer-perceived importance and satisfaction of each relationship quality, this study defines Θ as follows:

$$\Theta = \sum_{i=1}^{k} \left| \pi_{1i} - \pi_{2i} \right| \quad (1)$$

π_{1i} and π_{2i} are respectively the ratios of customer-perceived importance. The customer rates satisfaction in the k scale. The smaller the Θ value, the closer the customer-perceived importance is to the satisfaction. If the value equals 0, the customer-perceived importance is consistent with the satisfaction rating. The concept of region of acceptance in the performance evaluation matrix allows the existence of a gap between customer-perceived importance and satisfaction; it does not require both to be exactly the same. This study defines the tolerance as ε and evaluates whether the gap between customer-perceived importance and satisfaction is smaller than the tolerated gap, which is $\Theta > \varepsilon$. An immediate response is required if the result is statistically significant. The hypothesis is as follows:

$$H_0 : \Theta \le \varepsilon$$
$$H_A : \Theta > \varepsilon \tag{2}$$

The ε value is the sum of k gaps between π_{1i} and π_{2i}. If w_i stands for the weight of importance and satisfaction of the *i*th item, then

$$\sum_{i=1}^{k} w_i = 1 \text{ and } \left|\pi_{1i} - \pi_{2i}\right| = w_i\Theta,\ i = 1, \ldots, k. \tag{3}$$

Therefore, the hypotheses of model (2) are revised as

$$H_0 : \left|\pi_{1i} - \pi_{2i}\right| \le w_i\varepsilon \text{ for all } i = 1,...,k$$
$$H_A : \left|\pi_{1i} - \pi_{2i}\right| > w_i\varepsilon \text{ for some } i = 1,...,k \tag{4}$$

The statistical test of model (4) can be computed with Pearson's goodness-of-fit test (Desu, 2003).

$$\begin{aligned} T &= \sum_{i=1}^{k} \frac{\left(n_{1i} - n\hat{\pi}_{\cdot i}\right)^2 + \left(n_{2i} - n\hat{\pi}_{\cdot i}\right)^2}{n\hat{\pi}_{\cdot i}} \\ &= \sum_{i=1}^{k} \frac{\left(n_{1i} - n\frac{n_{\cdot i}}{N}\right)^2 + \left(n_{2i} - n\frac{n_{\cdot i}}{N}\right)^2}{n\frac{n_{\cdot i}}{N}} \\ &= \sum_{i=1}^{k} \frac{\left(n_{1i} - \frac{n_{\cdot i}}{2}\right)^2 + \left(n_{2i} - \frac{n_{\cdot i}}{2}\right)^2}{\frac{n_{\cdot i}}{2}} \\ &= \sum_{i=1}^{k} \frac{\left(n_{1i} - n_{2i}\right)^2}{n_{\cdot i}} \end{aligned} \tag{5}$$

Its statistical test is similar to degree of freedom $k-1$ of the chi square. When H_0 is rejected at level α, the region of rejection is defined as $\Omega = \{T \mid T \ge \chi^2_{(1-\alpha)}(k-1)\}$. Furthermore, in accordance with model (2) and formula (3),

$$\begin{aligned}\Theta \le \varepsilon &\Leftrightarrow \left|\pi_{1i}-\pi_{2i}\right| \le w_i\varepsilon \\ &\Leftrightarrow \left(\pi_{1i}-\pi_{2i}\right)^2 \le \left(w_i\varepsilon\right)^2 \\ &\Leftrightarrow \frac{\left(n_{\cdot i}\pi_{1i}-n_{\cdot i}\pi_{2i}\right)^2}{n_{\cdot i}} \le n_{\cdot i}\left(w_i\varepsilon\right)^2 \\ &\Leftrightarrow \frac{\left(n_{1i}-n_{2i}\right)^2}{n_{\cdot i}} \le n_{\cdot i}\left(w_i\varepsilon\right)^2\end{aligned} \tag{6}$$

It is retrieved from formula (6) that

$$\begin{aligned}&\sum_{i=1}^{k}\frac{\left(n_{1i}-n_{2i}\right)^2}{n_{\cdot i}} \le \varepsilon^2\sum_{i=1}^{k}n_{\cdot i}w_i^2 \\ &\Leftrightarrow T \le \varepsilon^2\sum_{i=1}^{k}n_{\cdot i}w_i^2\end{aligned} \tag{7}$$

Based on formula (7), the region of rejection is defined as $\Omega_0 = \{T \mid T \ge \chi^2_{(1-\alpha)}\left(k-1\right)+\varepsilon^2 W\}$, of which $W=\sum_{i=1}^{k}n_{\cdot i}w_i^2$ is the function of $\left(w_1,\ldots,w_k\right)$. Next this study uses mathematical programming to identify the extreme value W; the program is as follows:

Max Value $W=\sum_{i=1}^{k}n_{\cdot i}w_i^2$

Constraint $\sum_{i=1}^{k}w_i=1$

$\hat{W}$ stands for the extreme value identified through mathematical programming. By inputting the collected samples, this study defines the region of rejection as $\Omega_0 = \{T \mid T \ge \chi^2_{(1-\alpha)}\left(k-1\right)+\varepsilon_0{}^2\hat{W}\}$; of which ε_0 is the initial value.

The measuring process defined in this study is as follows:

1. Collect samples.
2. Select the ε_0 value and use mathematical programming to calculate $\hat{W}$, then compute $\Omega_0 = \{T \mid T \ge \chi^2_{(1-\alpha)}\left(k-1\right)+\varepsilon_0{}^2\hat{W}\}$ and compare its result with the significance level $\alpha = 0.05$.
3. Determine if the relationship quality meets the requirement through the following methods:
   (a) If $T(obs) \notin \Omega_0$, then H_0 is accepted, meaning that the importance and the satisfaction of the relationship quality meets the expected level.
   (b) If $T(obs) \in \Omega_0$, then H_0 is not accepted, then the importance and the satisfaction of the relationship quality fails to meet the expected level.

The significance level can be a loose ($\alpha = 0.1$), normal ($\alpha = 0.05$), or strict ($\alpha = 0.01$) type of level, it all depends on the conditions set at the beginning of the experiment. Next, this study refers to the method proposed by

Huang et al. (2003) and defines the "level of importance" and "level of satisfaction" indices in the questionnaire as follows:

$$I_i = \frac{\overline{X}_i - 1}{R} \quad \text{（Importance Index）}$$

$$S_i = \frac{\overline{Y}_i - 1}{R} \quad \text{（Satisfaction Index）}$$

$\overline{X}_i, \overline{Y}_i$ stands for the average score of an item in a recovered sample, $i = 1,\ldots,11$ and $R = k - 1$. This study uses the five-point Likert scale, so $R = 5 - 1 = 4$. When $I_i = 0$, customers attach no importance to the item involved and the level of importance is 0%. When $I_i = 1$, customers attach much importance to the item involved so the level of importance is 100%. When $I_i = 0.5$, customers attach an average importance to the item involved, so the level of importance is 50%. The level of satisfaction index is similar to that of the level of customer-perceived importance index, so these rules apply to it as well.

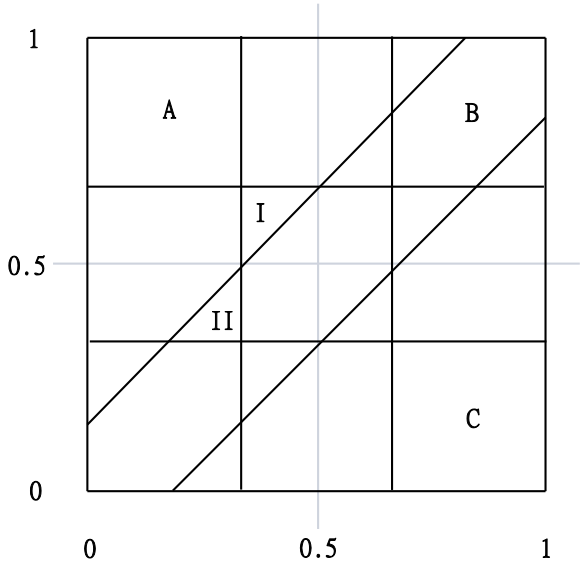

Fig. 1: The Performance Evaluation Matrix of Relationship Quality

The straight line equation is $Ax + By + C = 0$ and passes through the performance evaluation matrix; this study defines D_i as the distance between the coordinate (I_i, S_i) and the straight line equation. The point of projection of the coordinate (I_i, S_i) on the straight line equation is $\left(\frac{B^2 I_i - ABS_i - AC}{A^2 + B^2}, \frac{A^2 S_i - ABI_i - BC}{A^2 + B^2} \right)$, so the distance D_i between the two points is as follows:

$$D_i = \frac{\left| AI_i + BS_i + C \right|}{\sqrt{A^2 + B^2}}$$

As stated in Hung et al. (2003), the straight line equation in this study is $y = x$. Therefore, $A = 1$, $B = -1$, and $C = 0$. The point of projection of (I_i, S_i) on the straight line is $\left(\frac{I_i + S_i}{2}, \frac{I_i + S_i}{2}\right)$. The distance between the two points is as follows:

$$D_i = \frac{\left| I_i - S_i \right|}{\sqrt{2}}$$

The Rotation Matrix: When the rotation matrix multiplies the coordinate, the coordinate will be rotated counterclockwise by θ degree.

$$\begin{bmatrix} I_i' \\ S_i' \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} I_i \\ S_i \end{bmatrix}$$

The rotation of the performance evaluation matrix counterclockwise by θ degree produces a new performance evaluation matrix. Although the evaluation method is the same as the previous one, it helps to identify the problems in need of an immediate response more directly. After rotating Fig. 1 counterclockwise by 45° ($\theta = -45^\circ$), this study produces a new graph as shown in Fig. 2.

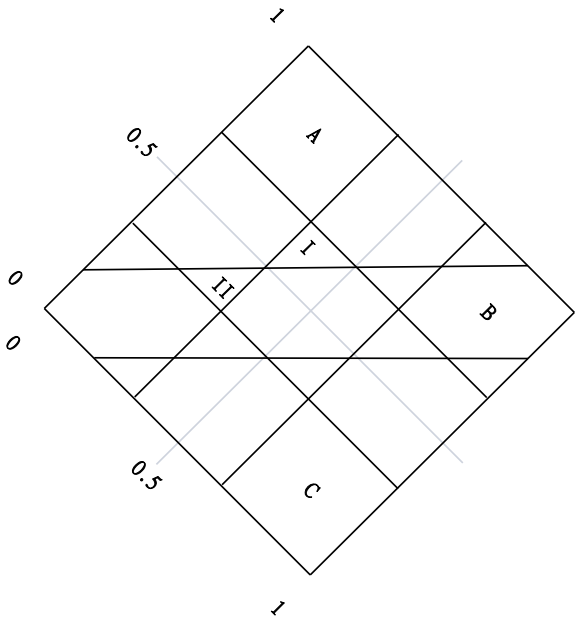

Fig. 2: The Performance Evaluation Matrix of Relationship Quality after Rotation

Fig. 3 is the result of Fig. 2 after the redefinition of the Cartesian coordinate system. After the performance evaluation matrix is redefined, the coordinate of items in the questionnaire is $\left(I_i', S_i'\right)$, $i = 1, \ldots, 11$. Hence it is defined that

$$D_i^{'} = \left| S_i^{'} \right|$$

Therefore, by inputting the value $D_i^{'}$ of each item in order, fitness and health club operators can easily and rapidly identify the relationship quality in need of improvement.

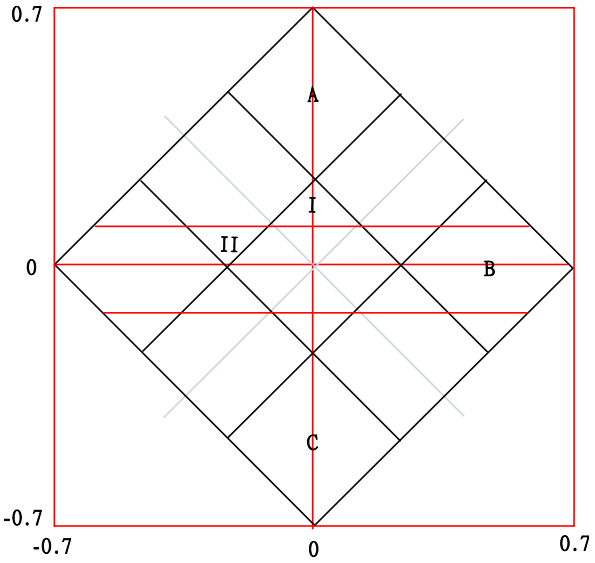

Fig. 3: The New Performance Evaluation Matrix of Relationship Quality

Analyze

After identifying the problems and the standard and method for measuring them, this study follows the model proposed by Pyzdek (2001) and uses the cause and effect diagram shown in Fig. 4 as the analytical tool for step three.

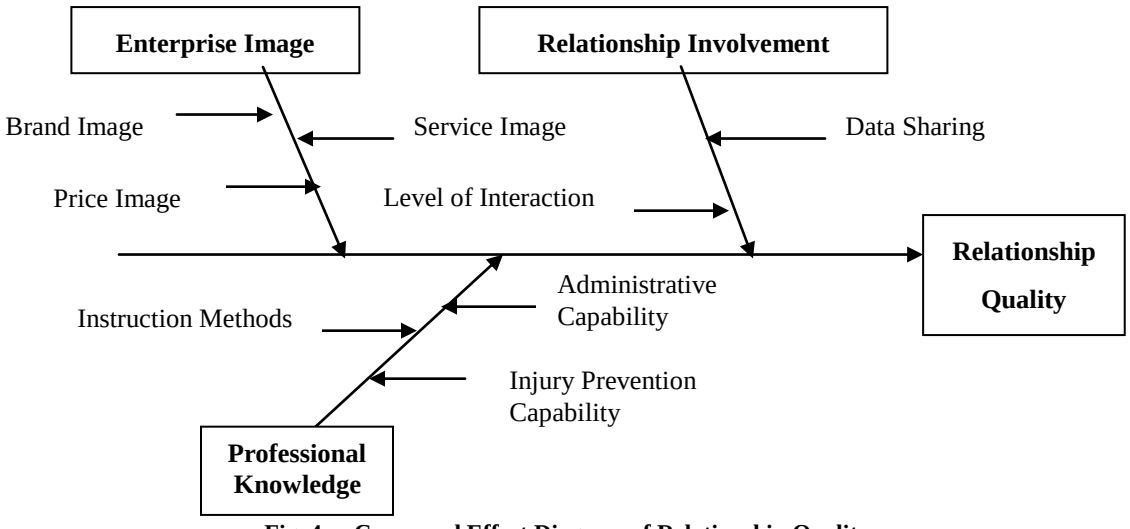

Fig. 4: Cause and Effect Diagram of Relationship Quality

Based on the cause and effect diagram, this study analyzes the following factors that help to improve the relationship quality of fitness and health clubs through three dimensions: enterprise image, relationship involvement, and professional knowledge.

Enterprise Image

Consumers' behavior is influenced by their perceived image of the fitness and health club they go to, meaning that consumers consume in accordance with their belief in and ideas about the club. Once an image of trust is developed in the consumers' minds, they will consume again (Kolter, 2000). The image of a fitness and health club includes the service image (shaped by consumers' perception toward a specific service provided by the fitness and health club), the price image (shaped by the consumers' perception toward membership and fees), and brand image (shaped by the consumers' attitude of the brand of the fitness and health club). By improving the enterprise image, a fitness and health club can improve its relationship quality (Waters & Paul, 1970).

Relationship Involvement

Fitness and health clubs share information between themselves and customers or among customers to create a highly involved partnership with its customers. If fitness and health club operators can take the initiative in sharing information regarding training courses, sales promotions and activities, and consumers are willing to express to the operators their satisfaction or dissatisfaction toward courses, facilities or services, the operators and the consumers will be able to form a benign interaction, which will in turn increase customer satisfaction and produce a positive influence on the relationship quality of fitness and health clubs.

Professional Knowledge

Employees of a fitness and health club should have professional knowledge regarding instruction methods, sports injury prevention, and administrative management. If the customers recognize the level of employees' professional knowledge or their ability to provide services, they tend to have a higher level of satisfaction. Therefore, by improving employees' knowledge about instruction, injury prevention and administrative management, a fitness and health club is able to provide more professional and satisfying services to its consumers, which in turn will increase customer satisfaction and relationship quality.

Improve

As stated above, this study uses the cause and effect diagram to identify the factors influencing the relationship quality of fitness and health clubs, which are enterprise image, relationship involvement, and professional knowledge. It puts the three factors in the rows and related sectors of a fitness and health club in the columns of the correlation coefficient matrix to find out the correlation between each factor and its corresponding sector and determine improvement plans for the corresponding sector. The analysis is as follows:

Table 1: Correlation Coefficient Matrix

Sector / Factor	Fitness Sector	Membership Affairs Sector	Marketing Sector
Enterprise Image	◎	◎	◎
Relationship Involvement	◎	◎	◎
Professional Knowledge	◎	◎	◎

Note: ◎ means direct correlation

Fitness Sector

Enterprise Image

First, fitness instructors can enhance their ability in class management and communication, so that they can build a good communication pattern, create a friendly classroom atmosphere, and make the customers feel welcomed. Instructors should take the initiative in providing necessary assistance and instruction to customers so

that they can use the facilities comfortably. They should also clean the exercise rooms and check if any facility needs maintenance on a daily basis so as to provide a comfortable, clean and safe environment for customers.

Relationship Involvement

Instructors can share with the customers the latest, useful information about health, sports products and activities through social media, bulletin boards or in person. They can also take the initiative in caring about the customers' exercise status and share their experience when the situation sees fit, so that they can create a benign interaction with the customers.

Professional Knowledge

Based on the courses they teach, instructors should continue to improve themselves by acquiring the latest in professional knowledge, instruction methods and information about injury prevention. By doing so, they are able to provide the customers with the latest information about sports injury prevention and best in professional instruction, which in turn will increase customer satisfaction toward teaching quality.

Member Affairs Sector

Enterprise Image

Service personnel in the member affairs sector should improve their etiquette. They should provide services to customers in a sincere, thoughtful and polite manner and respond rapidly to customers' needs or complaints so as to improve the fitness and health club's image.

Relationship Involvement

Service personnel in the member affairs sector should take steps to enhance customer relationship management. In addition to answering customers' questions actively, they should take the initiative in providing information concerning customers' rights, such as change in course schedules, changes of opening hours, and annual sales promotions.

Professional Knowledge

Service personnel in the member affairs sector should receive training in document management, and communication and administrative management so as to provide professional and sincere services to customers. In particular, good documentation and administrative management allows service personnel to serve the customers in an efficient manner, which in turn will improve customer satisfaction toward fitness and health clubs.

Marketing Sector

Enterprise Image

Marketing personnel should help fitness and health clubs to produce reasonable pricing plans by giving consideration to their profit-oriented, quantity-oriented, image-oriented and stability-oriented objectives as well as the factors of cost structure, market demand, competitions, consumers, products, and marketing channels. By doing so, they can to improve their pricing strategies and enterprise image.

Relationship Involvement

Marketing personnel should take the initiative in sharing information regarding sales promotions through social media, company Web site or telephone so as to ensure that customers can get the best deal thereby creating a benign interaction and trusting relationship with the customers.

Professional Knowledge

Marketing personnel should enhance their knowledge concerning products, markets and members. By doing so, they can improve their ability to analyze and explain product features, customers' needs, and market characteristics. They will also be able to convey correct and comprehensive information to consumers and answer customers' questions with confidence as well as address concerns about products, prices, and promotions.

Control

Fitness and health club operators make improvements based on the aforementioned strategies, and then evaluate the results with the measurement methods proposed by this study. If the results fail to meet the standard, the operators need to reexamine and revise the improvement strategies until the standard is met. If the results meet the standard, the operators need to implement the step of control. This study establishes an importance-satisfaction gap control mechanism in an effort to monitor the relationship quality of fitness and health clubs in an effective manner. The test statistic *T* of the gap Θ between the importance and satisfaction levels obeys the chi square distribution with $k-1$ degree of freedom, so the control limit is as follows:

$$UCL = \chi^2_{(k-1)}(1-\alpha/2) + \varepsilon_0{}^2\hat{W}$$

$$CL = \chi^2_{(k-1)}0.5 + \varepsilon_0{}^2\hat{W}$$

$$LCL = \chi^2_{(k-1)}\alpha/2 + \varepsilon_0{}^2\hat{W}$$

Fitness and health club operators can monitor the risk management performance with the aforementioned upper control limit, lower control limit and center line. If the performance falls outside the control limit, an immediate examination and correction is required to ensure the relationship quality of fitness and health clubs.

IV. CONCLUSION AND SUGGESTIONS

Conclusion

In the manufacturing industry, business owners can eliminate poor quality products through screening and inspection as an effort to reduce the defect rate. However, to fitness and health club operators, the process of providing services involves the participation of customers. Therefore, while providing services, fitness and health club operators need to give consideration to enterprise image, customer relationship involvement and employees' professional knowledge to improve customers' trust and satisfaction and create good relationship quality. This study adopts the quality control mechanism and the performance evaluation matrix of the DMAIC method in Six Sigma to improve the relationship quality of fitness and health clubs. In the Six Sigma quality control mechanism, the first step is "define", which is to identify and examine defects seriously affecting the relationship quality; the second step is "measure", which is to examine defects during the operational process; the third step is "analyze", which is to look into related data to seek out the root cause of problems; the fourth step is "improve", which is to remove the aforementioned defects during the operational process; and the fifth step is "control", which is to examine the results of improvements and sustain the results to avoid the reoccurrence of defects. Furthermore, this study adopts the concept of Hung et al. (2003) and uses the nine performance boxes generated by the importance-satisfaction matrix (with importance as the horizontal axis and satisfaction as the vertical axis) of IPA to help fitness and health club managers to identify services which will ensure high customer satisfaction. By introducing Six Sigma and IPA into the operation and management of fitness and health clubs, managers can improve relationship quality in a consistent and effective manner, create a competitive advantage, and increase operational performance.

Suggestions

Suggestion to Management Practices

This study adopts the Six Sigma program to improve the relationship quality of fitness and health clubs. It is discovered that enterprise image, relationship involvement, and professional knowledge are the three major factors that directly improve the relationship quality of fitness and health clubs. Hence, fitness and health club operators should provide necessary on-the-job training to employees in order to improve their service attitude, professional skills and relationship quality with the customers.

Suggestion for Future Studies

This study adopts the Six Sigma program to develop a measurement mechanism and to evaluate the relationship quality of fitness and health clubs. It is suggested that future studies carry out experimental research on consumers of fitness and health clubs and specifically identify factors and strategies to improve the relationship quality with experimental data, the Six Sigma quality control mechanism, and the performance evaluation matrix.

AUTHOR INFORMATION

Kuei-Mei Cheng, Ph.D., was born in Changhua, Taiwan, R.O.C, on January 01, 1975. She received the M. A. degree in health, physical education and recreation from University of South Dakota, USA, in 1997, and the DSM degree in sport management from United States Sports Academy, USA, in 2004. In 2004, she joined the faculty of National Taiwan University of Physical Education & Sport as an associate professor in the department of sport management. Her areas of research interest are consumer behavior, service quality and marketing strategy. E-mail: kmaycheng@yahoo.com.tw; ccmei@ntupes.edu.tw

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